

Original article

Assessment of lung function among urban station policemen

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Abstract

Introduction: Police officers are involved in difficult, stressful, demanding work. In addition to station duties they are also involved in patrolling, clearing traffics, crowd control etc. As such they are at risk of exposure to air pollution. So far many pulmonary function studies have been done among traffic police personnel but since the station police officers are also at risk of exposure to air pollution and this study was done to assess the ventilatory parameters of these police personnel. Aim of this study is to assess the pulmonary functional status among urban station police officers.

Method: The present study was carried out in 50 station policemen in the age group of 30 – 50 years of Chennai city using a computerized spirometer. The pulmonary parameters assessed were FVC, FEV1/FVC ratio. Their mean values (+/- SD) were compared with their predicted values and their statistical significance analyzed by using unpaired T-test.

Result: There was a significant decrease (p value < 0.001) in FVC when compared with their predicted values. There was no change in FEV1/FVC ratio.

Conclusion: Urban station policemen showed restrictive pattern of lung disease.

Keywords: Air pollution, Forced Vital Capacity, Restrictive lung Disease

INTRODUCTION:

The incidence of allergic respiratory disease such as asthma, bronchitis etc is increasing throughout the world and it is mainly seen in people living in urban areas than compared to rural areas. The outdoor air pollution resulting from rapid industrialization, explosive growth of population that leads to increased motor vehicle usage was the major contributing factor in urban areas. The World Health Organization has estimated that approximately 800 000 deaths were due to urban air pollution (WHO, 2002). So far, many pulmonary function studies have been done among traffic police personnel (Karita et al., 2001; Saenghiunvattana et al., 1995), because they work in the busy traffic signal areas for years together and are exposed to risk of air pollution. But the station police officers are also involved in

patrolling, clearing traffics and crowd control and as such they are also at risk of exposure to air pollution. So this study was done to assess the pulmonary parameters of these station police men in urban areas.

AIM:

To assess the pulmonary functional status of urban station police officers.

MATERIALS AND METHODS:

The present study was carried out in 50 station policemen in the age group of 30 – 50 years, of Chennai city, using a computerized spirometer. All the policemen were residing in greams road police quaters, Chennai. They were posted out of station for 3 days in a week. All of them have similar duty timings and their levels of exposure were matched. They were informed about the study and written consent was obtained from them.

Inclusion criteria

1. Station housed police men , age group 30 - 50 years
2. Residential area - police quaters, greams road, Chennai.
3. Duration of service 10 – 25 years

Exclusion criteria

1. Any pre-existing respiratory diseases like COPD, Tuberculosis, Corpulmonale
2. Any pre-existing cardiac problems
3. Acute respiratory infections
4. Smokers
5. Obesity
6. Skeletal deformity
7. Any history of chronic medication

METHODOLOGY

The pulmonary function test was done by using computerized spirometer and was performed according to the method suggested by American Thoracic Society (1995). Spirometer used in this study is flow sensing type. Each subject was asked to perform atleast 3 forced expiratory maneuvers to ensure reproducibility of results.

Procedure:

1. Allow enough time between tests for patient to recover.

RESULT:

In this study average duration of their service was 18.8 ± 3.9 years. The mean \pm SD of FVC was 3.01 ± 0.39 L and the predictive value was 3.41 ± 0.31 L. There is a significant decrease in the FVC value ($P < 0.001$) of urban station police officers compared to their predicted values. There was no significant change in FEV_1/FVC ratio.

2. Patient should be seated comfortable and nose should be closed with a nose clip to prevent air entry through the nose.
3. The patient needs to practice the exercise before actually performing the test. Have the patient breath in and out deeply several times.
4. The patient should take a deep breath and blow out as fast as and as quickly in to the mouth piece.
5. Ask the patient to blow out as fast and as quick as they can for at least six seconds.
6. The flow volume loop was recorded.

The following pulmonary parameters were assessed

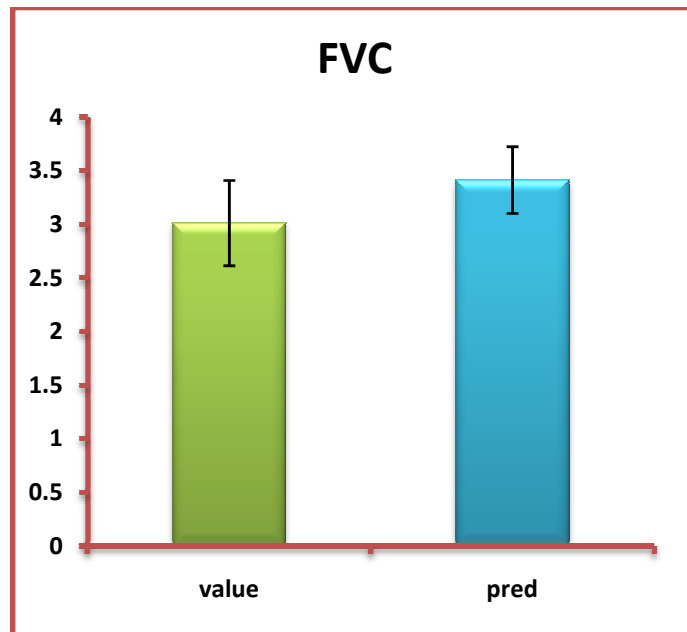
1. FVC- Forced vital capacity
2. FEV₁/FVC ratio

FVC - Volume of air that can be expired rapidly with a maximum expiratory effort after maximum inspiration.

FEV₁/FVC ratio - It indicates what percentage of the total FVC was expelled from the lungs during the first second of forced exhalation

The mean values (\pm SD) of FVC, FEV₁/FVC were compared with their predicted values and their statistical significance was analyzed by using unpaired T-test.

	MEAN ± SD		P-VALUE
	VALUE	PREDICTED VALUE	
FVC	3.01±0.39	3.41±0.31	<0.001
FEV ₁ /FVC RATIO	86.94 ± 6.98	85.67 ± 8.83	0.426



DISCUSSION:

The main function of lung is to maintain normal oxygen and carbon-di-oxide tension in arterial blood. This was achieved through the mechanism of ventilation, diffusion and perfusion. The latest computerized spirometers were used by most of the hospitals and research labs to assess the ventilation function of the lung, such as the tidal volume (TV) gives an idea about the normal requirement of oxygen during rest, Vital capacity is the maximum

amount of air taken in or out of the lungs per breath. MVV is the maximum amount of air breathed in or out of the lungs per minute (MVV = VC × Respiratory rate). Both are indicators of functional capacity of the lungs. FEV₁/FVC indicates the obstructive or restrictive type of disorders of lung; FEF_{25-75%} reflects patency of small and large airways. Urban air pollution is now considered as a serious public health problem. Many epidemiological studies have found a close association between the

traffic exposure and development of respiratory symptoms (WJ SI, 1993). In obstructive lung disease FEV1 is reduced more than FVC and FEV1/FVC ratio is less than 70%, whereas in restrictive pattern FVC is less than 80% of predicted value.

In the present study it was found out that there was a significant decrease in FVC, while the FEV1/FVC ratio was normal. FVC denotes the functional capacity of the lung. Here 24% of policemen showed a reduction in FVC < 80%, indicating that there is some degree of restriction. Similar finding have been observed in studies conducted in Kolkata (Lahiri et al.,2000ab) and Kanpur (Sharma et al., 2004).Pulmonary function test carried out among Bangkok traffic police men showed restrictive pattern as well as obstructive pattern of lung disease

(Saenghirunvattana S et al 1995). Jindal et al., 2006 observed that inhalation of particulate matter is an important cause for interstitial lung disease.

CONCLUSION:

Based on the above pulmonary parameters it was concluded that the urban station policemen showed restrictive pattern (decreased FVC, normal FEV1/FVC ratio) of lung disease. The results suggest that the administration should be sensitized by the health department to provide them with protective equipments such as mask fitted with air filters and the station policemen should be educated to use such protective equipments and do regular master health checkup along with pulmonary function test.

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